(US 6,905,814, Aubay reference hereinafter.). The examiner rejected claim 1 as being anticipated by Soane et al. (US Publication 2003/0013369, Soane reference hereinafter.). The examiner rejected claim 1 as being anticipated by Marchi-Lemann et al. (US 6,132,745, Marchi reference hereinafter.). The examiner rejected claims 1, 2, 4, 7-10 as being unpatentable over Glenn et al. (US 6,235,683, Glenn reference hereinafter.).

In response, claim 2 was amended to include further limitations. Claim 11 was added to claim the feature of titanium dioxide concentration feature, which was deleted in the amended claim 2, as a dependent claim of claim 2.

The added limitations in the amended claim 2 are as follows:

"the composition contains adjuvants necessary for plant growth one or more selected from the silver nanoparticles, the fertilizer ingredients; and a surfactant for dispersion, one or more selected from a cationic surfactant, a nonionic surfactant, an anionic surfactant, an ampotheric surfactant."

The added limitations are supported by lines 26-28, page 10, lines 10-18, page 13, lines 8-11, and 14, page 14, lines 1-6, page 15 of the original specification.

The differences of the invention claimed in the amended claims from the disclosure of the cited references are explained below.

I. The present invention and Aubay reference are compared.

Aubay reference discloses a film-forming titanium dioxide dispersion for cleaning and disinfecting surfaces. In order to clean or disinfect surfaces exposed to light, Aubay provides a mixture prepared by depositing a film of titanium dioxide in the form of elementary particles whose size is less than 100 nm, and whose specific surface area is greater than 150 m^2/g on the surfaces with a film-forming dispersion comprising organic or organosiloxane polymer as essential ingredients.

The purpose of Aubay's invention is to keep a surface clean and to reduce the frequency of cleaning for surfaces encountered in the food industry, kitchens, bathrooms, washrooms, hospitals, glazing, facades, etc, for which cleaning is essential.

On the other hand, the present invention describes a composition for promoting plant growth that contains titanium dioxide nanoparticles, the size of which are from 3 ~

200 nm. Titanium dioxide nanoparticles are absorbed on the surface of the plant and promotes photosynthesis.

Therefore, the purpose of claims 1, 2, 4 and 7 of the present application is completely different from the purpose of Aubay reference.

It is obvious that when titanium dioxide is exposed to ultraviolet light, it forms radical hydroxide and thus decomposes organic materials and keeps hydrophile property thereby preventing contaminant from adhering.

To utilize such effect of titanium dioxide, as in the cited reference, since titanium dioxide must be placed at the outermost position of an object, a composition, which can be effectively coated on a surface of an object and adhered to the surface, is required to be manufacutured.

As an example, example 1 of Aubay reference discloses a mixed dispersion that includes dispersion of titanium dioxide in 3% ethylene glycol REPEL O TEX QCJ (15% aqueous dispersion of 13% film-forming antisoiling ethylene terephthalate/ polyoxyethylene terephthalate copolymer) isopropanol 47.5% deionized water 36.5%. That is, since Aubay reference cannot satisfy the purpose with only the titanium dioxide dispersion liquid, it provides a dispersion that includes organic or organosiloxane polymer.

On the other hand, the present invention a dispersion which includes only titanium dioxide having size of 3~200 nm for promoting plant growth, and the dispersion can be quickly absorbed to the surface of the plant without a special support layer.

If the titanium dioxide dispersion of Aubay reference that includes organic polymer is sprayed on the leaf surface of a plant, stomatas may be clogged and a big obstacle for plant growth may be created.

Meanwhile, the features of adjuvants necessary for plant growth and surfactant for dispersion in claims 2 and 7 of the present application are to suggest that addition of material that helps actual plant growth to the composition consisting of titanium dioxide nanoparticles of the present invention is possible. Also, claim 2 describes adjusting pH with organic or inorganic acid in order to prevent rapid precipitation of the component, and claim 4 describes that the titanium dioxide colloid has titanium dioxide crystal structure selected from anatase, rutile and brookite in order to improve the advantageous

effects of the present invention.

As explained above, the invention claimed by the claims 1, 2, 4 and 7 is different from Aubay reference in their use, composition and advantageous effects. Thus, the present invention is not anticipated by Aubay reference.

II. The present invention and Soane reference are compared.

Soane reference discloses a textile-reactive nanoparticle comprising a payload entrapped within a polymeric encapsulator. The polymeric encapsulator comprises at least one textile-reactive functional group on its surface for attaching to a textile fiber. The payload is selected from the group consisting of a dye, a sunblock agent, a metallic reflector colloid, etc. The sunblock agent is selected from TiO_2, ZnO, SiO_2, Fe_2O_3, etc. and The size of the sunblock agent particles ranges from 10 nm to about 150 nm. That is, Soane reference discloses an invention in which sunblock agent can be used inside a polymeric encapsulator that is provided to be permanently attached to textile, and one of the sunblock agents is titanium dioxide.

As explained above, Soane reference discloses an invention, in which titanium dioxide is used for the purpose of blocking ultraviolet light, for attaching the composition to textile eventually.

However, the present invention is to promote plant growth with promoting photosynthesis by making nanoparticles of titanium dioxide be absorbed to the plant.

Also, Example III-1 of Soane reference discloses a composition that is prepared by adding 0.50 Grams of silica-coated TiO_2 particles to 30 mL of isooctane and 3 mL of 3-(triethoxysilyl)propylsuccinic anhydride.

As explained above, Soane reference is related to titanium dioxide nanoparticles that is used in polymeric encapsulator to block ultraviolet ray. On the other hand, the present invention describes a composition for promoting plant growth that contains titanium dioxide nanoparticles as active ingredient. Therefore, the composition of the present invention is completely different from that of Soane reference.

The effect of the Soane reference is that ultraviolet ray is blocked by using titanium dioxide. On the other hand, the effects of the present invention are that

nanoparticles of titanium dioxide are absorbed into the leaf surface of the plant and promote photosynthesis and decomposition of organic material; the portion of unabsorbed titanium dioxide remaining on the leaf surface surface make plants resistant to external stress and also to have positive effects in that it shows a bactericidal and defensive effects against various phytopathogens.

Therefore, even though titanium dioxide is commonly used, the present invention is different from the disclosure of Soane reference in their use, composition and advantageous effects. Thus, claim 1 is not anticipated by Soane reference.

III. The present invention and Marchi reference are compared.

Marchi reference discloses cosmetic compositions comprising pigment nanoparticles and fillers. The cosmetic composition includes at least one nanopigment that is selected from nanoparticles of iron oxide, titanium dioxide, zinc oxide, bismuth oxychloride, calcium silicate, chromium oxide, chromium hydroxide, ammonium ferric ferrocyanide, ferric ferrocyanide, kaolin, manganese violet, ultramarine and carbon black. In Marchi reference, nanoparticles of titanium dioxide is used to block untraviolet light, and the size of pigment nanoparticles ranges from 0.01 to 0.15 microns (10 ~ 150 nm).

However, claim 1 of the present invention describes a liquid composition for promoting plant growth that contains titanium dioxide nanoparticles as active ingredient and the particle size of the titanium dioxide nanoparticles ranges from 3 ~ 200 nm.

March reference uses titanium dioxide nanoparticles in cosmetic compositions in order to block ultraviolet light. The present invention uses titanium dioxide nanoparticles to promote plant growth by promoting photysynthesis.

In addition, the advantageous effects of the Marchi reference are that a protective barrier which blocks ultraviolet light is formed on the skin, and when the cosmetic compositions are used in makeup, they exhibit greater homogeneity of the color. On the other hand, the effects of the present invention are that nanoparticles of titanium dioxide are absorbed into the leaf surface of the plant and promote photosynthesis and decomposition of organic material; the portion of unabsorbed titanium dioxide remaining on the leaf surface surface make plants resistant to external stress and also to have positive effects in that it shows a bactericidal and defensive effects against various

phytopathogens.

Therefore, claim 1 of the present the invention is not anticipated by Marchi reference.

IV. The present invention and Glenn reference are compared.

Glenn reference discloses a particulate material for preventing formation of ice by enhancing supercooling of a plant to temperatures below about -2 degree Celsius and thereby preventing water from freezing even though the temperature is below 0 degree Celsius. The particulate material comprises a hydrophilic core and a hydrophobic outer surface and the hydrophilic core comprises at least one of calcium carbonate, mica, talc, kaolin, bentonite, pyrophillite, dolomite, silica, feldspar, sand, quartz, chalk, limestone, diatomaceous earth, baryte, aluminum trihydrate, and titanium dioxide.

In other words, the Glenn reference is related to a method of preventing cold-weather damage and freezing damage of a plant by forming a continuous membrane of particulate materials that has a hydrophilic core and a hydrophobic outer surface, so that the hydrophobic outer surface prevents forming of water droplet on a plant surface, and the hydrophilic core comprises one of the above listed materials.

Also, the particulate material has a size less than 100 μm and a composition including the particulate material is applied on the leaf surface of a plant so that the surface is covered partially or entirely. The more the leaf surface is covered, the less becomes the chance of ice crystal nucleus formation thereby preventing cold-weather damage and the freezing damage.

The use of Glenn reference is prevention of cold-weather damage and the freezing damage of plants. The use of present application is promotion of plant growth and hence completely different from that of Glenn reference.

Also, in the composition of Glenn reference the titanium dioxide nanoparticles do not act directly, but particulate material having a core made of titanium dioxide and coated with hydrophobic surface is attached to the surface of a plant and produces effect of enhancing supercooling of plant. On the other hand, the effects of the present invention are that nanoparticles of titanium dioxide are directly absorbed into the leaf surface of the plant and promote photosynthesis and decomposition of organic material

thereby promoting growth of plant directly; the portion of unabsorbed titanium dioxide remaining on the leaf surface surface make plants resistant to external stress and also to have positive effects in that it shows a bactericidal and defensive effects against various phytopathogens.

That is, the composition of Glenn reference cannot fulfill its purpose only with titanium dioxide and coating to form hydrophilic material and other materials for attachment to a plant must be added additionally. However, the present invention, specifically claim 1 uses only titanium dioxide nanoparticles ranging from 3~200 nm without separate materials to be absorbed into a plant and get the effect of promoting plant growth.

Also, Glenn reference limits the size of the particulate material, having a hydrophilic core and a hydrophobic outer surface, less than 100 μm to manifest hydrophobic property. However, the present invention uses titanium dioxide nanoparticles, the size of which ranges from 3 to 200 nm in order to make the nanoparticles be absorbed into plant and to promote photosynthesis thereby promoting plant growth.

Therefore, the present invention is different from the disclosure of Glenn reference in their use, composition and advantageous effects.

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Att'y Docket No. 1728.03

CONCLUSION

The applicant believes that the rejections were obviated by the amendment of claims, and the application is now in condition for allowance: therefore, reexamination, reconsideration and allowance of the claims are respectively requested. If there are any additional comments or requirements from the examination, the applicant asks for a non-final office action.

The Commissioner is hereby authorized to charge payment of any additional fees associated with this communication, or credit any over-payment to Deposit Account No. 16-0310.

Very truly yours,
Park Law Firm

Dated: July 31, 2006

By: _____
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